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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/965,630	09/27/2001	Jason K. Shiepe	PES-0043	2487

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EXAMINER	
CREPEAU, JONATHAN	

ART UNIT	PAPER NUMBER
1746	

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/965,630	SHIEPE ET AL.
	Examiner	Art Unit
	Jonathan S. Crepeau	1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25,40-44 and 50-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25,40-44 and 50-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1-25, 40-44, 50, 51, and newly added claims 52-56. Claims 3 and 4 are newly rejected under 35 USC §102 and claims 40 and 41 are newly rejected under 35 USC §103, but these rejections were not necessitated by amendment. All other pending claims are newly rejected under 35 USC §102 or §103 as necessitated by amendment. As such, this action is non-final.

As a further note, some parts of the amendment are not legible. In particular, some of the strikethrough notations are not visible. Applicants are encouraged to correct the problem by changing the font, using express mail instead of facsimile, or by another appropriate measure. The amendment, as viewable by the Examiner, is also viewable by Applicants via the public or private PAIR system.

Claim Suggestions

2. In claim 9, the recitation that "the polymer is an elastomeric threaded, woven, or stitched within the porous support" is awkward. Appropriate correction is suggested but not required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3 and 4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 3 has been rewritten in independent form incorporating the subject matter of claim 1. However, the subject matter of intervening claim 2 was not incorporated into claim 3, thereby resulting in a lack of clarity because some of the limitations near the end of the claim lack proper antecedent basis. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. Claims 1-7, 9, 10, 12, 15, 18-20, and 50 are rejected under 35 U.S.C. 102(b) as being anticipated by Fuglevand et al (U.S. Patent 6,030,718). The reference teaches a fuel cell comprising first and second electrodes (160), an electrolyte membrane (151), first and second flow fields, and porous flow field members (171, 172) in fluid communication with the flow fields (see Fig. 26). The member comprises a porous support having a series of layers (in layer 171) having a hydrophobicity gradient (see col. 9, line 54). Layer 171 comprises particulate carbon and a hydrophobic polymer (e.g., PTFE) and/or a hydrophilic polymer (e.g., ionomer) and layer 172 comprises a carbon cloth integrated with polymer (see col. 9, line 42, col. 9, line 52, col. 10, line 66). Regarding claims 3 and 4, layer 171 comprises 20-90% of support material (i.e., particulate carbon).

Thus, the instant claims are anticipated.

6. Claim 54 is rejected under 35 U.S.C. 102(b) as being anticipated by Sobolewski (U.S. Pre-Grant Publication No. 2001/0036523). The reference teaches a fuel cell comprising two electrodes, an electrolyte, gas flow fields, and flow field members between the flow fields and electrodes (see Fig.1). The flow field members comprise a metallic porous support integrated with a plurality of carbon nanotubes (see paragraph 23).

Thus, the instant claim is anticipated.

Claim Rejections - 35 USC § 103

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuglevand et al.

The reference is applied to claims 1-7, 9, 10, 12, 15, 18-20, and 50 for the reasons stated above. However, the reference does not expressly teach that the porosity of the flow field members is between 20-80%, as recited in claim 11.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be sufficiently skilled to adjust the porosity of the flow field member of Fuglevand et al. to affect the gas diffusion properties of the electrode. Further, Fuglevand teaches in column 11, line 14 that "in addition to the foregoing, the method further comprises, after the sintering step, applying a predetermined pattern of pressure of a given value to the diffusion layer 171, and which is effective to vary the

porosity of the resulting diffusion layer 170." As such, Applicant's claimed porosity range is not considered to distinguish over the reference.

8. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 97/13287.

WO '287 teaches a fuel cell comprising first and second electrodes, an electrolyte membrane, first and second flow fields (17), and porous flow field members (16) in fluid communication with the flow fields (see Figs. 2 and 8). The member comprises a porous support modified to provide hydrophilicity or hydrophobicity. The support can be made of electrically conductive carbon cloth and a polymer (i.e., PTFE or ion exchange resin) (page 12, line 1 et seq.). The member comprises two layers (18, 16), each having a different porosity (see col. 10, line 32 et seq.).

However, the reference does not expressly teach that the supports comprise three layers each having a different porosity, as recited in claim 56.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of WO '287 vary the porosity across the plurality of layers. On page 10, line 34, WO'287 teaches that "the porous layer (16) is a layer of an electrically conductive porous material having at least two portions with different mean pore sizes." This disclosure fairly suggests that the porous member may have more than two layers. As such, it would have been obvious to use a third support in the member in the fuel cell of Fuglevand, such support having a larger porosity than the second support (note teachings of increasing porosity on page 14, line 18

et seq. of WO '287). It is further noted that the duplication of parts is generally not considered to distinguish over a reference (MPEP §2144.04).

9. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO '287 in view of Speranza et al (U.S. Pre-Grant Publication No. 2001/0008722).

WO '287 is applied for the reasons stated above. However, the reference does not expressly teach that the flow field members comprise an electrically conductive material selected from the group consisting of Nb, Zr, Ta, Ti, Co, and mixtures and alloys thereof.

Speranza et al. is directed to a screen/frame assembly for an electrochemical cell. The screen functions as a gas diffusion member and is made of Nb, Ni, Co, Zr, Ti, steel, or Ti.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the screen of Speranza et al. in the flow field member of WO '287. In paragraph 7, Speranza et al. teach that "what is needed in the art is an improved screen assembly which provides structural integrity and simplified cell assembly while maintaining or improving the cell's mass flow characteristics." As such, the artisan would be sufficiently motivated to use the screen of Speranza et al. in the flow field member of WO '287.

10. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson (U.S. Patent 5,641,586).

The reference teaches a fuel cell comprising first and second electrodes, an electrolyte membrane, first and second flow fields (12), and a porous flow field member (24) in fluid communication with the first flow field (see Fig. 1B). The member comprises a porous support modified to provide hydrophilicity or hydrophobicity (see col. 4, line 46 et seq). The porous support may comprise sintered particles, woven metal screens (cloths), and non-woven metal screens (see col. 5, line 10).

However, the reference does not expressly teach that the support is a sintered metal cloth, as recited in claim 40.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to sinter the metal cloth of Wilson '586. Such a sintering step would serve to increase the structural integrity of the cloth because the fibers would be fused together. Further, as noted above, Wilson '586 teaches "sintered particles," therefore fairly suggesting such a sintering step. As such, the instant claims are not distinguished over the Wilson '586 reference.

11. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson '586 as applied to claims 40 and 41 above, and further in view of Sobolewski.

Wilson '586 does not expressly teach that the porous supports comprise carbon nanotubes, as recited in claim 53.

As set forth above, Sobolewski teaches a gas diffusion layer comprising carbon nanotubes.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the nanotubes of Sobolewski in the flow field member of Wilson '586. In paragraph 22, Sobolewski teaches that "the present invention provides a diffusion substrate structure with improved electromechanical characteristics, more specifically, reduced flow resistance for cross plane flow of active fuel agents and reaction products, and reduced electrical resistance in the direction perpendicular to the plane of said substrate." As such, the artisan would be motivated to use the nanotubes of Sobolewski in the flow field member of Wilson '586.

12. Claims 8, 13, 14, 16, 17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuglevand in view of Wilson '586.

Fuglevand is applied to claims 1-7, 9, 10, 12, 15, 18-20, and 50 for the reasons stated above.

Fuglevand does not expressly teach that the porous supports comprise metal screens or sintered metal cloths, as recited in claims 13, 16, 17, and 21.

As noted above, Wilson '586 teaches or fairly suggests metal screens and sintered metal cloths as supports in porous members for fuel cells.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the structures of Wilson '586 in the fuel cell of Fuglevand. The disclosure of Wilson '586 indicates that metal screens and sintered metal cloths are functionally equivalent to carbon cloths when used in porous current-collecting members for fuel cells. As such, it would be obvious to substitute the metal screens or sintered metal cloths of Wilson '586 for the carbon paper of Fuglevand. An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982); MPEP §2144.06.

Further, the artisan would be motivated to use nickel or steel in the member of Wilson '586. As would be appreciated by the artisan, these materials have characteristics such as high strength and high oxidation resistance. As such, it would be obvious to use these materials in the cloth or screen of Wilson '586, and subsequently of Fuglevand.

13. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuglevand in view of Sobolewski.

Fuglevand is applied to claims 1-7, 9, 10, 12, 15, 18-20, and 50 for the reasons stated above.

Fuglevand does not expressly teach that the porous supports comprise carbon nanotubes, as recited in claim 52.

As set forth above, Sobolewski teaches a gas diffusion layer comprising carbon nanotubes.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the nanotubes of Sobolewski in the flow field member of Fuglevand. In paragraph 22, Sobolewski teaches that "the present invention provides a diffusion substrate structure with improved electromechanical characteristics, more specifically, reduced flow resistance for cross plane flow of active fuel agents and reaction products, and reduced electrical resistance in the direction perpendicular to the plane of said substrate." As such, the artisan would be motivated to use the nanotubes of Sobolewski in the flow field member of Fuglevand.

14. Claims 40-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 97/13287 in view of Wilson '586.

WO '287 teaches a fuel cell comprising first and second electrodes, an electrolyte membrane, first and second flow fields (17), and porous flow field members (16) in fluid communication with the flow fields (see Figs. 2 and 8). The member comprises a porous support modified to provide hydrophilicity or hydrophobicity. The support can be made of electrically conductive carbon cloth and a polymer (i.e., PTFE or ion exchange resin) (page 12, line 1 et seq.). Regarding claims 42 and 43, the member comprises two layers (18, 16), each having a different porosity (see col. 10, line 32 et seq.).

WO '287 does not expressly teach that the porous supports comprise sintered metal cloths, as recited in claim 40, or that the supports comprise three layers, as recited in claim 44.

However, the artisan would be motivated by the disclosure of WO '287 to use three supports in the fuel cell. On page 10, line 34, the reference teaches that "the porous layer (16) is a layer of an electrically conductive porous material having at least two portions with different mean pore sizes." This disclosure fairly suggests that the porous member may have more than two layers. As such, it would have been obvious to use a third support in the member in the fuel cell of WO '287, such support having a larger porosity than the second support (note teachings of increasing porosity on page 14, line 18 et seq.). It is further noted that the duplication of parts is generally not considered to distinguish over a reference (MPEP §2144.04).

Further, as set forth above, Wilson '586 fairly suggests the use of sintered metal cloths as supports in porous members for fuel cells.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the sintered metal cloths of Wilson '586 in the fuel cell of WO '287. The disclosure of Wilson '586 indicates that sintered metal cloths are functionally equivalent to carbon cloths when used in porous current-collecting members for fuel cells. As such, it would be obvious to substitute the metal screens or sintered metal cloths of Wilson '586 for the carbon paper of WO '287. An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982); MPEP §2144.06.

15. Claims 22-25 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuglevand in view of WO '287.

Fuglevand is applied to claims 1-7, 9, 10, 12, 15, 18-20, and 50 for the reasons stated above. The reference further teaches that the layer 171 comprises a plurality of layers but does not expressly teach that the layers each have a different porosity, as recited in claims 22 and 51.

WO '287 teaches a flow field member having two layers having different porosity, as set forth above. Further, the reference teaches that the supports may comprise a titanium-based compound (see page 12, line 10).

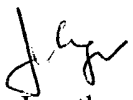
Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of WO '287 vary the porosity across the plurality of layers in addition to the hydrophobicity. On page 10, line 34, WO'287 teaches that "the porous layer (16) is a layer of an electrically conductive porous material having at least two portions with different mean pore sizes." This disclosure fairly suggests that the porous member may have more than two layers. As such, it would have been obvious to use a third support in the member in the fuel cell of Fuglevand, such support having a larger porosity than the second support (note teachings of increasing porosity on page 14, line 18 et seq. of WO '287). It is further noted that the duplication of parts is generally not considered to distinguish over a reference (MPEP §2144.04).

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr, can be reached at (571) 272-1414. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau
Primary Examiner
Art Unit 1746
October 1, 2004